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FROM  
(NAME-LOCATION-PHONE)

B. J. Sevey

CS7L

Corporate Engineering

(4-6913)

DATE

April 7, 1983

SUBJECT

CEA 3808 MAIN SOUTH  
TRUNK SEWER, W. G. K.

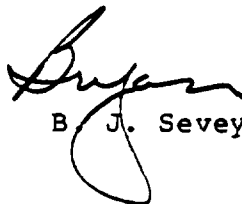
CEA 3808 Main South Trunk  
Sewer, 4-7-83

REFERENCE

TO : Distribution

Attached is the approved Appropriation Project Definition Report. Significant changes from the August 4, 1982 draft of the PDR are marked in the right hand column with a vertical line. They are primarily:

1. Changes in the distribution.
2. Soils dewatering to be accomplished by plant forces rather than the contractor.
3. Deletion of the relocation of 5th Street and associated railroad crossings.
4. The ACL Waste Pre-treatment Project, CEA 3741, has been approved and is under construction.

  
B. J. Sevey

BJS/kh

Attachment

MCO 6360418

# CORPORATE ENGINEERING DEPARTMENT

## Appropriation Project Definition Report

CEA 3808

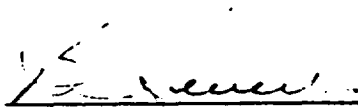
Main South Trunk Sewer

Monsanto Industrial Chemicals Company

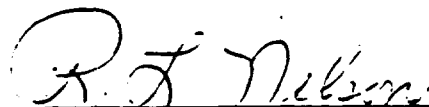
W.G. Krummrich Plant


March 28, 1983

Approved By

  
B. J. Sevey  
Project Manager

  
R. L. Wiese  
Manager MIC Engineering

  
R. L. Nelson  
Manufacturing Representative

  
W. L. Smull  
General Superintendent, TSD.

MCD 6360419

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CEA 3808  
MAIN SOUTH TRUNK SEWER

APPROPRIATION  
PROJECT DEFINITION REPORT

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MCO 6360420

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CEA 3808 - MAIN SOUTH SEWER  
APPROPRIATION PROJECT DEFINITION REPORT

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MCO 6360421

I. Project Synopsis

This project will provide a new 42 inch diameter, Monsanto owned, trunk sewer to carry all the plant sewer load now carried by the two Sauget Village sewers. The two existing village sewers are in a very deteriorated condition due to the high acidity of the plant wastes, and require extensive repairs. Repair of the village sewers will be the responsibility of the village.

The new sewer will combine most plant sewer loads into one discharge point where sampling and measuring devices will be provided. The exceptions are sulfuric acid manufacturing, the laboratory and Lot A which discharge into the village sewer on the north side of the plant. The existing south plant sewer system has about nineteen discharge points into the village sewer.

II. Project Results and Commitments

A. Project Results Statements and Priorities

The major result to be realized from this project is to provide a reliable acid proof sewer to handle the plant sanitary, storm and process discharges. This will isolate Monsanto's discharges from the other industrial and residential area wastes and provide a single Monsanto discharge which will be monitored.

During project execution cost will be of first priority over improved project timing. Careful planning is required to minimize impact on plant production and maintenance.

B. Products, Capacity and Raw Materials

1. Products - Not applicable.
2. Capacity - The existing South Trunk Sewers are discharging approximately 27 cfs (12,000 GPM) flowing full. These sewers carry approximately 95% of the main plant discharge.

The new South Trunk Sewer is planned to be 42" Ø and have a theoretical capacity of 45 cfs (20,000 GPM) at 0.2% slope. For a flat site, such as the W. G. Krummrich Plant, it can be assumed that as much as an inch of rain accumulates before runoff begins. On this basis, the 42 inch sewer would have sufficient capacity to handle a 5 year frequency storm with a 15 minute duration.

MCO 6360422

II. Project Results and Commitments - continued

The village system downstream from Monsanto's discharge consists of a 42" Ø sewer under Route 3 and two (2) 36" Ø sewers from west of Route 3 to the treatment plant.

The critical accuracy range of the flume is between 3000 and 8,000 GPM.

3. Raw Materials - Not applicable.

C. Manning, Operability and Maintainability

The sewer will be designed and constructed to minimize maintenance. The sewer will be extra strength vitrified clay tile encased in reinforced concrete to maintain the integrity of the furan resin acid proof joint cement. Manholes will be reinforced concrete with acid proof brick lining. Manholes will be provided at each direction change to provide for easy inspection and cleaning.

Permanent plant manpower will not be effected by this project. (See Section II. F.)

D. Utilities and Energy Conservation

The utility requirements for this project are electrical power used for heating, ventilating and lighting the sampling house and operating the sampler (approximately 5kw maximum) and temporary power to operate deepwell dewatering pumps (about 8 pumps at 25 HP each).

"Product Energy Rate" does not apply to this project.

"Energy and Utility Costs for Evaluating Project Capital Alternates" do not apply to this project.

E. Control of Hazards and Environment

1. Control of Hazards

No new hazards are associated with this project. The composition of the plant effluents are not changed by this project. Prevention of explosive mixtures in the sewer vapor space is currently accomplished at the points of entrance into the plant sewer system and is unchanged by this project.

MCO 6360423

## II. Project Results and Commitments

### E. Control of Hazards and Environment - continued

#### 2. Employee Exposure to Hazardous Materials

This project will not change employee exposure. The sample house will be provided with forced ventilation for use when employees are in the building.

#### 3. Environment

This project will reduce the load on the existing village sewers during heavy rainfalls and help to alleviate upstream flooding of the plant and the village, which occurs from time to time.

#### 4. Noise

Plant and community noise levels will not be affected.

### F. Other Commitments

Plant maintenance personnel will maintain the deep well dewatering pumps and controls. And, they will move pumps from deepwell to deepwell as sewer construction progresses. This includes electrical connections and discharge water piping.

## III. Project Premises

### A. Site Location Premises

The new sewer will run westward, roughly following the plant's 5th street from south of building BBO to the village sewer box just east of State Route 3. The new sewer will be north of the two existing village sewers.

Soil conditions vary greatly and are expected to be unstable. Most excavated soil will be unsuitable for backfill. Some soil will be chemically contaminated and must be disposed of per established plant procedures. The ground water level is high and fluctuates widely depending on types of soil encountered, the Mississippi River level and rainfall.

### B. Process Premises

Not applicable.

MCO 6360424



### III. Project Premises - continued

#### C. Ex-Project Utility Premises

Required utilities can be provided from existing plant sources.

#### D. Ex-Project Waste Treatment

The new plant sewer will discharge into the Sauget Village sewer system east of State Route 3, as it presently does, and be carried westward to the Sauget Physical/Chemical Treatment Plant for treatment before discharge into the Mississippi River. In the future, after primary/chemical treatment, the effluent will go to the American Bottoms Regional Treatment Facility, expected to be operational for secondary treatment in 1986.

#### E. Ex-Project Service Premises

No new service facilities are needed to support this project.

#### F. Related Projects

CEA 3741, ACL waste pre-treatment has been approved. Design of this project will be influenced by design in progress or complete on CEA 3741.

#### G. Permits and License Requirements

No discharge permits are required since the new sewer is a replacement sewer and no increase in flow or pollutant loading to the municipal system will result.

Infringements of Village of Sauget right-of-ways must be negotiated with the village by the Plant.

### IV. Project Risks

#### A. Technical Risks

Technical risks are considered minimal on the project. Design and construction will take into account experiences gained on CEA 3088 which replaced many of the main plant sewers.

MCO 6360425

IV. Project Risks - continued

B. Environmental Risks

This project is not expected to significantly change any environmental risk. This project will reduce the load on the existing Village of Sauget sewers upstream of Monsanto's discharge. Village sewer loading downstream of Monsanto's discharge will remain the same as it is now.

C. Vulnerability

This project is considered vulnerable to capital and expense deviations. Deep excavations will be subject to flooding due to unpredictable weather and high ground water levels. Unstable soils require extensive shoring. An unknown quantity of soil will be chemically contaminated and will require controlled disposal.

Project strategy calls for the plant to be responsible for maintaining ground water level below the sewer construction elevations. Construction trade unions could object to this strategy. Cost for union labor to man the deepwell pumps, should a jurisdictional dispute be lost by Monsanto, is in the magnitude of \$1,000k.

This project has been developed with consultation from Gampco (contractor for Queeny spill control project CEA 3189). However, poor soil conditions and the extent of ground water dewatering cannot be better quantified without extensive soil testing and actual dewatering tests.

D. Likelihood of Changes in Definition

No significant changes in project definition are anticipated.

E. Execution Risks

Soils - A wide variety of soils are expected. Seventy-five percent of the soil is expected to be of poor quality for use as backfill. A portion may be contaminated and require special handling and disposal. Excavations will be deep and require extensive shoring. Where soils are particularly unstable or excavation is adjacent to important structures, sheet piling may be required.

MCO 6360426

IV. Project Risks - continued

Ground Water - Extensive dewatering is required. Assuming 100' of open ditch, three 8" Ø wells at 50' intervals, 60' depth and pumps at 25 hp each, may be required. An additional two wells may be in operation around a new upstream manhole simultaneously, making a total of about five working wells. Approximately 35 wells are required. All wells will have to be drilled along the entire route of the new sewer, with power available to each, with about 8 of them equipped with pumps, before the sewer contractor starts sewer construction. Well drilling and sewer construction must be separated by time to avoid jurisdictional disputes. Acidity of ground water may be high in some areas. Acid resistant pumps should be used.

The risk of subsidence exists. Test wells, or piezometers, are required to monitor and restrict draw down to a reasonable limit to protect existing structures, including the existing village sewers. Migration of contaminated water from the existing sewers is a possibility.

Acid Proof System - Integrity of the new sewer acid proof system will be the lump sum contractors risk. However it is mandatory that Monsanto continually inspect quality.

Underground Obstructions - Underground obstructions and utilities are apt to be encountered. A thorough drawing investigation will be conducted during design, but the risk remains.

V. Project Description

A. Facility Description

The new sewer will, in general, be parallel and north of the two existing village south trunk sewers. About 1660 lineal feet of 42 inch diameter main trunk sewer pipe will be required. Also, several smaller branch sewers are needed to tie into existing sewers.

Construction will be of extra strength vitrified clay tile encased in reinforced concrete. Joints will be made with Furan resin acid proof cement. Sewer manholes and inlet boxes will be reinforced concrete, fully lined with an acid proof system. Approximately 30 will be needed, about 18 manholes, and about 12 branch inlet boxes.

MCO 6360427

V. Project Description

A. Facility Description - continued

Parshall flume flow measurement and liquid sampling facilities will be provided near the point of discharge into the Sauget Village sewer system.

Design and construction will conform generally with CED Master Specification for Yard Chemical Sewers - Clay Pipe A8.2 STD 3.

Two cross connections will be provided to allow the village to divert their flows to the new sewer while they repair their own. This also allows Monsanto to use the village sewers during emergency repairs. At the conclusion of such work the connection would be plugged off.

B. Plot Plans

Preliminary plot plans are included in Appendix A.

VI. Project Strategy

A. Design Strategy

Project design will be in-house by the MCI SPEO group. No pre-approval funding will be requested.

Drawings will be corrected to "As Built" conditions at completion of the job.

B. Construction, Checkout and Completion Strategy

Construction will be via lump sum union contractors. Separate bids will be solicited for the wells. Sewer construction will not start until the wells are operational.

Winter weather will be an adverse factor. Furan application is temperature sensitive.

Manholes must be constructed around existing operating sewers. When appropriate the existing sewer is to be "broken out" in the new manhole and sewage allowed to flow through the new sewer. The old sewer connections would then be permanently plugged. Prior to any tie-in, related sewers must be checked for hazardous gas and fluids. The plant will flush the sewers until safe to work.

MCO 6360428

V. Project Description

B. Plot Plans - continued

Where we cannot build around an operating sewer, by-pass pumping or siphoning between existing manholes will be required.

Some areas of construction will interfere with production, especially around some loading docks. Close coordination is required between the Plant Manufacturing Representative and Construction.

In general, overtime is not required for completion of this project.

The plant will isolate railroad tracks from service to allow for sewer crossings. The tracks involved can be serviced from the north end of the plant by the Terminal Railroad.

CED has existing, adequate receiving and storage capability.

CED has existing, adequate temporary construction facilities. A shower trailer is available.

Extensive shoring and dewatering of excavations will be a major construction factor. Contaminated soil is expected. Such soil must be handled per plant procedures and hauled to a licensed disposal site.

Checkout (including leak testing) and start-up will be on a sequential basis. Construction will start at the Route 3 Village of Sauget collection box and proceed east. As sections are completed between major manholes they will be tested and activated. Inflatable bladders will be utilized as temporary pipe plugs.

VII. Facilities Description for Estimate, Schedule and Control

Category 01 - Equipment Items (Lichtenheld)

Existing plant sampling equipment will be duplicated.

Category 02 - Instrument Items (Harber)

Existing plant ultrasonic flow instrumentation will be duplicated.

New Parshal Flume, maximum flow 12,000 GPM, minimum accurate range 3,000 to 8,000 GPM.

MCD 6360429

VII. Facilities Description for Estimate, Schedule and Control  
continued

Category 03 - Set & Test Equipment (Lichtenheld)  
Set and test liquid sampler.

Category 04 - Set & Test Instruments (Harber)  
Set and test new ultrasonic flow indicator, recorder  
and totalizer.

Category 05 - Piling (Lichtenheld)  
None required.

Category 06 - Excavation (Lichtenheld)  
Excavation (for bldg. and misc.) 10 cu. yd.  
Backfill, compacted 8 cu. yd.

Category 07 - Foundations (Lichtenheld)  
Building slab 2 cu. yd.

Category 08 - Supports, Platforms & Structures (Lichtenheld)  
None required.

Category 09 - Other Building Items (Lichtenheld)  
1- 3' x 7' mandoor.  
(2) 8" Ø vent fans.

Category 10 - Sprinklers and Fire Protection (Lichtenheld)  
None required.

Category 11 - Piping (Lichtenheld)  
None required.

Category 12 - Ductwork (Lichtenheld)  
None required.

Category 13 - Electrical (Harber)  
1. Set 2 new poles and run about 100' of guy strand and  
feeder from existing meter house to new meter house for  
power.  
2. Mount electric heater with thermostat, vent fan, new  
breaker panel and power for sample pump. About 50'  
conduit.  
3. Mount 2 receptacles, 2 fluorescent fixtures, and switch  
for new meter house. About 50' conduit.

MCO 6360430

VII. Facilities Description for Estimate, Schedule and Control

Category 13 - Electrical (Harber) - continued

4. Run (2) 2" conduits underground and encased in concrete from new meter house to new manhole with flune. About 75'.
5. Temporary power to 35 deepwells.
6. Deepwell high/low, stop/start alarms (8 sets).

Category 14 - Site Preparation (Lichtenheld)  
 None required.

Category 15 - Sewers, Drains, and Plumbing (Lichtenheld)

Excavation	20,000 c.y.
Backfill, compacted (in place) (75% new fill)	17,000 c.y.
3" gravel areas	260 tons
Sewers, VCP (extra strength)	
42"Ø	1,660 L.F.
24"Ø	40 L.F.
18"Ø	25 L.F.
15"Ø	235 L.F.
12"Ø	425 L.F.
8"Ø	300 L.F.
6"Ø	90 L.F.
Concrete encasement, 2 pour, reinforced per Spec. A8.2 STD 9, Figure 5	1,660 c.y.
Concrete manholes, curb inlets, trench	630 c.y.
C.I. frames and grates, heavy duty	30 ea.
Galvanized trench grating, 1"	20 S.F.
Acid brick, for manholes, with Furan joints	11,000 S.F.
Fill 1/4" space behind acid brick with molten sulfur	
Asphalt membrane, outside surface of manholes	15,000 S.F.
Asphalt membrane, fiber reinforced	11,000 S.F.
Bentonite membrane beneath all manhole footings for protection against chemical attack.	
Sewer plugs, concrete with acid brick and furan mortar joints	40 ea.
Pre-molded fiberglass sheet with furan resin on underside of manhole lids	900 S.F.

MCO 6360431

VII. Facilities Description for Estimate, Schedule and Control

Category 15 - Sewers, Drains, and Plumbing (Lichtenheld)  
continued

Sheeting, timber	20,000 S.F.
Sheet piling MP 112, 15' embedment	14,000 S.F.
Structural steel wales and struts reuse 100' sections	8 tons
Purchase steel piling	7,600 S.F.
"Cage" sheeting	1,700 F.L.

Provide allowances for plugging off sewers and pumping or siphoning around sewer sections during tie-ins.

Provide allowance for hydrostatic testing.

Furnish (8) 25 HP deepwell pumps.

(35) 60' deepwells.

"Temporary" discharge piping for 8 sets of deepwell pumps (to be moved from well to well as construction progresses).

Provide dewatering wells operating costs by plant at \$100k.

All roadway curbs, paving and sidewalks will be replaced in kind.

Category 16 - Underground Piping (Lichtenheld)

None required.

Category 17 - Yards, Roads and Fencing (Lichtenheld)

None required.

Category 18 - Railroads (Lichtenheld)

See Category 93.

Category 19 - Insulation - (Lichtenheld)

None required.

Category 20 - Painting - (Sevey)

None required.

Category 21 - Walls, Masonry Roofs & Roofing (Lichtenheld)

8' x 8' x 8' high concrete block building with 4" poured concrete roof. Concrete blocks to be split faced with Korfil Insulation inserts.

MCO 6360432



VII. Facilities Description for Estimate, Schedule and Control  
continued

Category 22 - Spares (Lichtenheld)  
None required.

Categories 50, 51, 53, 55, 58 & 67 (By Murphy, Steib)  
Work up from "zero base" indirects estimate.

Category 80 - Engineering  
Work up from manhour and travel estimate from each discipline.

Category 81 - Outside Engineering  
Provide allowance for outside consultation (\$20k).

Category 90 - Dismantling  
Provide an allowance for unknowns. Dismantle the existing CED fab shop.

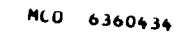
Category 91 - Sales and Use Taxes (Steib)

Category 92 - Repairs Expense  
Normal allowance.

Category 93 - Relocation & Modification Expense (Harber, Lichtenheld, Steib)  
Allowance to relocate underground obstructions.  
Remove and reinstall 13 railroad tracks.

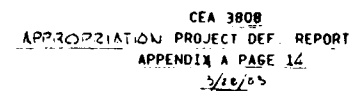
Category 94 - Startup Relocation & Modification Expense  
Expense - use an allowance.

MCO 6360433



CEA 3808  
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 APPENDIX A PAGE 1b  
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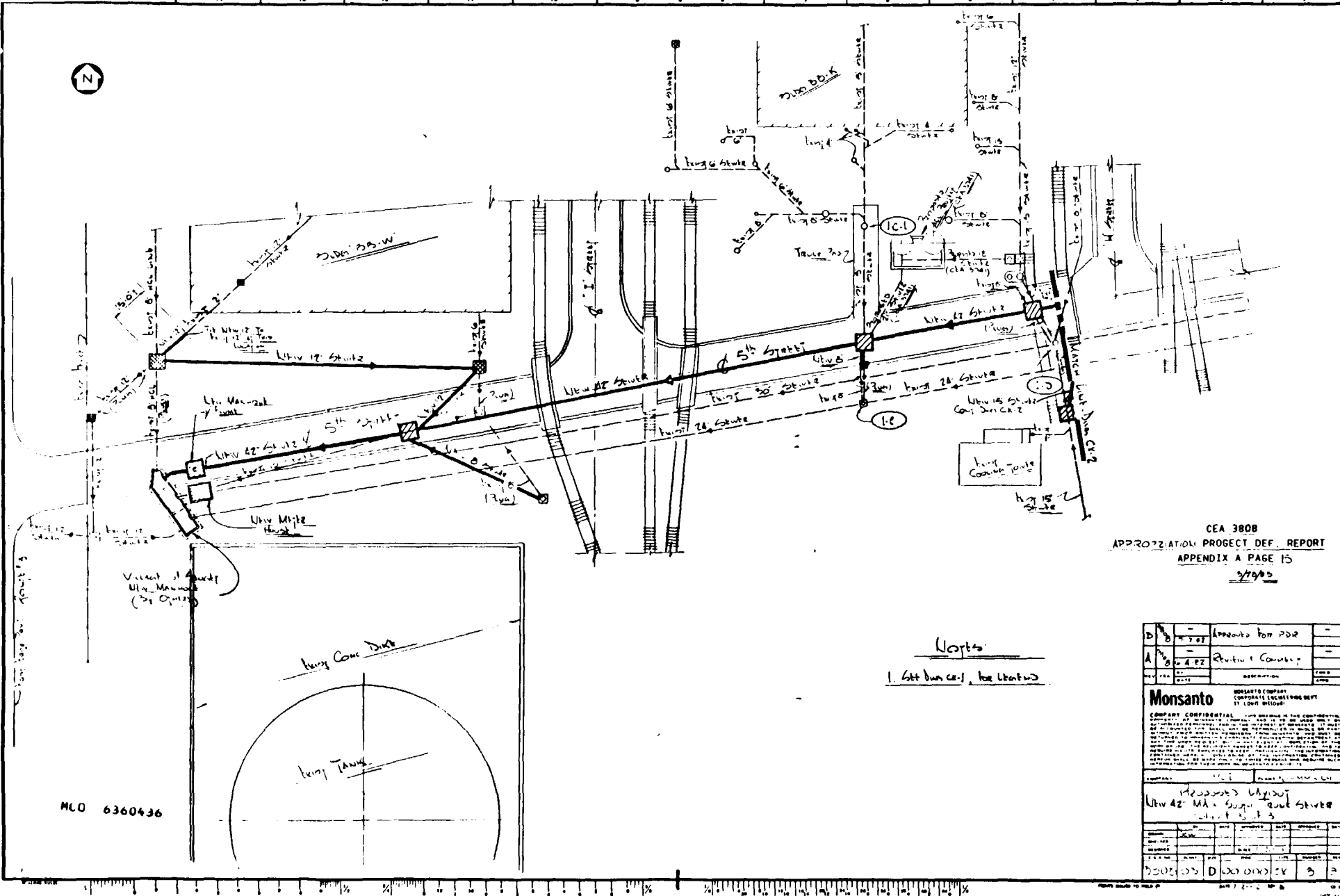


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MCO 6360435

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CEA 3808  
APPROPRIATION PROJECT DEF. REPORT  
APPENDIX A PAGE 15  
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